WHAT IS CLAIMED IS:

1. A method for determining a combustion temperature in a gas turbine having a compressor, combustion section and a turbine through which flows a working fluid, said method comprising the steps of:

a) sensing a water content of the working fluid, and

b) including the water content as one factor used to determine the combustion temperature.

2. A method for determining a combustion temperature as in claim 1 wherein the actual water content is sensed upstream of the compressor.

3. A method for determining a combustion temperature as in claim 1 wherein the combustion temperature is a gas turbine firing temperature and said water content is a factor of an algorithm for determining the gas turbine firing temperature.

4. A method for determining a combustion temperature as in claim 1 wherein the combustion temperature is a combustion reference temperature and said water content is a factor of an algorithm for determining the combustion reference temperature.

5. A method for determining a combustion temperature as in claim 1 further comprising determining the water content of the working fluid based on measurements made by a dry bulb temperature sensor and a wet bulb temperature sensor, wherein each sensor is sensing the working fluid upstream of the compressor.

6. A method for determining a combustion temperature as in claim 1 wherein the water content is sensed upstream of the compressor and downstream of a water injection system.

7. A method for determining a combustion temperature as in claim 6 wherein the water injection system is an evaporative cooler in an air intake duct of the gas turbine.

8. A method for determining a combustion temperature as in claim 6 wherein the water content is a water fraction of water in the working fluid, and the water fraction is based on ambient water content of ambient air entering the water injection system and an amount of injected water.

9. A method for determining a combustion temperature as in claim 8 wherein the ambient water content is determined based on a dry bulb temperature of ambient air entering the water injection system and a web bulb temperature of the ambient air.

10. A method for determining a combustion temperature as in claim 8 wherein the amount of injected water is determined by sensing a flow rate of water to the injection system and a flow rate of the working fluid through the injection system.

11. A method for determining a combustion temperature as in claim 6 wherein the water injection system includes a supersaturation grid of atomizing nozzles coupled to at least one water distribution manifold.

12. A method for determining combustion temperature in a combustion section of a gas turbine having a compressor and a turbine wherein the combustion temperature is based on factors including exhaust gas temperature, turbine pressure ratio, and compressor discharge temperature, the improvement comprising the steps of:

a.) measuring an actual water content of an air stream entering the compressor, and

b.) including the actual water content as one of the factors used to determine the combustion temperature.

13. A method for determining combustion temperature as in claim 12 wherein the water content is determined from a water fraction of ambient air entering an air intake duct of the gas turbine, and on the rate of water injected into the air by a water injection system coupled to the air intake duct.

14. A control system for determining a combustion temperature of a gas turbine having a compressor, combustion section and a turbine, said system comprising:

at least one water content sensor upstream of the compressor generating data indicative of a water content of air entering the compressor,

a processor executing an algorithm for determining the combustion temperature based in part on the data indicative of the water content, and

data and program memory storing the data indicative of water content and the algorithm for execution by the processor wherein said processor generates an output indicative of the determined combustion temperature to control the combustion section.

15. A control system as in claim 14 wherein the control of the combustion section comprises a combustion fuel rate valve responsive to the output.

16. A control system as in claim 14 wherein the at least one water content sensor comprises a dry bulb temperature sensor and a wet bulb temperature sensor.

17. A control system as in claim 14 wherein the gas turbine further includes a water injection system and said control system further comprises a first dry bulb temperature sensor upstream of the water injection system and a second dry bulb temperature sensor downstream of the water injection system.

18. A control system as in claim 17 further comprising a web bulb temperature sensor upstream of the water injection system.

19. A control system as in claim 14 wherein the gas turbine further includes a supersaturating grid of water atomizing nozzles, and said system comprises a web bulb temperature sensor and dry bulb temperature sensor upstream of the grid, and a water flow sensor generating data indicative of a rate of water atomized by the nozzles.